

1 **(March 10, 2003)**

2 **Contractor Surveying - Roadway**

3 Copies of the Contracting Agency provided primary survey control data are available for
4 the bidder's inspection at the office of the Project Engineer.

5
6 The Contractor shall be responsible for setting, maintaining, and resetting all alignment
7 stakes, slope stakes, and grades necessary for the construction of the roadbed,
8 drainage, surfacing, paving, channelization and pavement marking, illumination and
9 signals, guardrails and barriers, and signing. Except for the survey control data to be
10 furnished by the Contracting Agency, calculations, surveying, and measuring required
11 for setting and maintaining the necessary lines and grades shall be the Contractor's
12 responsibility.

13
14 Detailed survey records shall be maintained, including a description of the work
15 performed on each shift, the methods utilized, and the control points used. The record
16 shall be adequate to allow the survey to be reproduced. A copy of each day's record
17 shall be provided to the Engineer within three working days after the end of the shift.

18
19 The meaning of words and terms used in this provision shall be as listed in "Definitions
20 of Surveying and Associated Terms" current edition, published by the American
21 Congress on Surveying and Mapping and the American Society of Civil Engineers.

22
23 The survey work shall include but not be limited to the following:

- 24
- 25 1. Verify the primary horizontal and vertical control furnished by the Contracting
26 Agency, and expand into secondary control by adding stakes and hubs as well
27 as additional survey control needed for the project. Provide descriptions of
28 secondary control to the Contracting Agency.
 - 29
30 2. Establish the centerlines of all alignments, by placing hubs, stakes, or marks
31 on centerline or on offsets to centerline at all curve points (PCs, PTs, and PIs)
32 and at points on the alignments spaced no further than 50 feet.
 - 33
34 3. Establish clearing limits, placing stakes at all angle points and at intermediate
35 points not more than 50 feet apart.
 - 36
37 4. Establish grading limits, placing slope stakes at centerline increments not more
38 than 50 feet apart. Establish offset reference to all slope stakes.
 - 39
40 5. Establish the horizontal and vertical location of all drainage features, placing
41 offset stakes to all drainage structures and to pipes at a horizontal interval not
42 greater than 25 feet.
 - 43
44 6. Establish roadbed and surfacing elevations by placing stakes at the top of
45 subgrade and at the top of each course of surfacing. Subgrade and surfacing
46 stakes shall be set at horizontal intervals not greater than 50 feet in tangent
47 sections, 25 feet in curve sections with a radius less than 300 feet, and at 10-
48 foot intervals in intersection radii with a radius less than 10 feet. Transversely,
49 stakes shall be placed at all locations where the roadway slope changes and
50 at additional points such that the transverse spacing of stakes is not more than
51 12 feet.
- 52

- 1 7. Establish intermediate elevation benchmarks as needed to check work
- 2 throughout the project.
- 3
- 4 8. Provide references for paving pins at 25-foot intervals or provide simultaneous
- 5 surveying to establish location and elevation of paving pins as they are being
- 6 placed.
- 7
- 8 9. For all other types of construction included in this provision, (including but not
- 9 limited to channelization and pavement marking, illumination and signals,
- 10 guardrails and barriers, and signing) provide staking and layout as necessary
- 11 to adequately locate, construct, and check the specific construction activity.
- 12

13 The Contractor shall provide the Contracting Agency copies of any calculations and
14 staking data when requested by the Engineer.

15
16 To facilitate the establishment of these lines and elevations, the Contracting Agency will
17 provide the Contractor with primary survey control information consisting of descriptions
18 of two primary control points used for the horizontal and vertical control, and
19 descriptions of two additional primary control points for every additional three miles of
20 project length. Primary control points will be described by reference to the project
21 alignment and the coordinate system and elevation datum utilized by the project. In
22 addition, the Contracting Agency will supply horizontal coordinates for the beginning
23 and ending points and for each Point of Intersection (PI) on each alignment included in
24 the project.

25
26 The Contractor shall ensure a surveying accuracy within the following tolerances:

	<u>Vertical</u>	<u>Horizontal</u>
28 Slope stakes	±0.10 feet	±0.10 feet
29 Subgrade grade stakes set		
30 0.04 feet below grade	±0.01 feet	±0.5 feet
31		(parallel to alignment)
32		±0.1 feet
33		(normal to alignment)
34		
35		
36 Stationing on roadway	N/A	±0.1 feet
37 Alignment on roadway	N/A	±0.04 feet
38 Surfacing grade stakes	±0.01 feet	±0.5 feet
39		(parallel to alignment)
40		±0.1 feet
41		(normal to alignment)
42		
43 Roadway paving pins for		
44 surfacing or paving	±0.01 feet	±0.2 feet
45		(parallel to alignment)
46		±0.1 feet
47		(normal to alignment)
48		

49 The Contracting Agency may spot-check the Contractor's surveying. These spot-
50 checks will not change the requirements for normal checking by the Contractor.

51

1 When staking roadway alignment and stationing, the Contractor shall perform
2 independent checks from different secondary control to ensure that the points staked
3 are within the specified survey accuracy tolerances.
4

5 The Contractor shall calculate coordinates for the alignment. The Contracting Agency
6 will verify these coordinates prior to issuing approval to the Contractor for commencing
7 with the work. The Contracting Agency will require up to seven calendar days from the
8 date the data is received.
9

10 Contract work to be performed using contractor-provided stakes shall not begin until the
11 stakes are approved by the Contracting Agency. Such approval shall not relieve the
12 Contractor of responsibility for the accuracy of the stakes.
13

14 Stakes shall be marked in accordance with Standard Plan H-14. When stakes are
15 needed that are not described in the Plans, then those stakes shall be marked as
16 directed by the Engineer.
17

18 ***Payment***

19 Payment will be made in accordance with Section 1-04.1 for the following bid item when
20 included in the proposal:
21

22 "Roadway Surveying", lump sum.
23

24 The lump sum contract price for "Roadway Surveying" shall be full pay for all labor,
25 equipment, materials, and supervision utilized to perform the work specified, including
26 any resurveying, checking, correction of errors, replacement of missing or damaged
27 stakes, and coordination efforts.